Souvadra Hati

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EDUCATION

Georgia Institute of Technology   2022 – Present
PhD in Computer Science • GPA: 4.0/4.0   Atlanta, GA

- **Coursework:** High Performance Computing, Advanced Computer Architecture
- **Research Interests:** Co-Design of Genomics and Graph Workloads, Asynchronous Parallel Algorithms

Indian Institute of Science   2018 – 2022
Bachelor of Science in Biology • GPA: 8.4/10.0   Bangalore, India

- **Coursework:** Computational Genomics, Machine Learning, Game Theory, Systems Biology
- **Scholarship:** Cargill Global Scholars fellow, KVPY scholar (All India Rank: 242)

PUBLICATIONS

[1] **S. Hati**, A. Hayashi, R. Vuduc, Asynchronous Distributed-Memory Parallel k-mer Counting, *IPDPS 2025*

[2] S. Singhal*, **S. Hati***, J. Young, V. Sarkar, A. Hayashi, R. Vuduc, Asynchronous Distributed-Memory Parallel Algorithms for Influence Maximization, *Supercomputing 2024*. Link

[3] **S. Hati**, A. S. Duddu, M. K. Jolly, Operating Principles of Circular Toggle Polygons, *Physical Biology*, May 2021. Link

[4] A. S. Duddu, S. Sahoo, **S. Hati**, S. Jhunjhunwala, M. K. Jolly, Multi-stability in cellular differentiation enabled by a network of three mutually repressing master regulators, *Journal of Royal Society Interface*, Sep 2020. Link

RESEARCH

Asynchronous Genome Assembly   2022 – Present
Advisor: Richard Vuduc   Georgia Tech

- Designed asynchronous k-mer counting algorithm, **2-10x** speedup over `HySortK`, **15-100x** speedup over `KMC3`.
- Developed parallel *de-Bruijn graph* construction algorithm; **2-5x** speedup over `PakMan`.
- Implementation shows strong scaling up-to **6k CPU cores** of Phoenix cluster at Georgia Tech.
- Preliminary work was selected as a finalist for the ACM SRC Poster competition at Supercomputing 2023.

Influence Maximization on Social Network   2023 – Present
Advisors: Richard Vuduc, Vivek Sarkar   Georgia Tech

- Designed two parallel algorithms for finding influencers on distributed social network graphs.
- First influence maximization software that enables weak scaling, and breaks the memory scalability barrier.
- Implementation shows **5-30x** speedup over `Ripples`; strong scales up-to **8k CPU cores** of NERSC Perlmutter.

WORK EXPERIENCE

Research Intern - Intel Labs   Summer 2024
Manager: Fabrizio Petrini   Intel Parallel Computing Labs

- Developed a multithreaded, AVX512-based software to simulate 3-hop interconnect networks.
- Reduced simulation time of large networks from **30-60 days** to **2-6 hours**.

PAST PROJECTS

Fast Genome Size Estimation   2021 – 2022
Advisor: Chirag Jain   Indian Institute of Science

- Developed *MMC* toolkit, a fast and multithreaded minimizer counter. [Link]
- Designed a parallel algorithm to sparsely sample DNA k-mers while covering all the nucleotides in the genome.
- Developed mathematical framework for *minimizer*-space genome size estimation.

Cell-Cell Interaction in Cancer Systems   2020 – 2021
Advisor: Mohit Kumar Jolly   Indian Institute of Science

- Designed novel gene-regulatory network to model differentiation of CD4+ T-cells into different phenotypes.
- Developed MATLAB-based software to visualize the dynamics of biological networks.[Link]
- **Best Poster** at *SMB 2021* conference for deciphering the operating principles of *circular toggle polygon* networks.

SKILLS

Languages: C/C++, Python, MATLAB, R, Java, SQL, Julia
Libraries: CUDA, MPI, OpenMP, OpenSHMEM, AVX
Tools: Git, LaTeX