ASHKA SHAH

shahashka@uchicago.edu

EDUCATION

University of Chicago *Exp Graduation: 2025*
Ph.D. in Computer Science

Harvey Mudd College *May 2016*
B.S. in Physics

Computer Skills Python, PyTorch, Tensorflow, C++
Research Interests AI for science, causal discovery, optimal experimental design, systems biology

RESEARCH EXPERIENCE

University of Chicago Fall 2019-current
Department of Computer Science, Advisor: Rick Stevens *Chicago,IL*

- Ongoing work: parallel causal discovery using overlapping graph partitioning. Proof that divide-and-conquer strategy produces consistent results in infinite data limit. Empirical analysis of speed and accuracy with comparable algorithms.
- Developed SP-GIES – a structure learner that achieves 4x speedup compared to existing algorithms. SP-GIES learns causal relationships of gene interaction networks using interventions (GitHub link)
- Leveraged graph representations of enumerated drug libraries for efficient navigation of the chemical space using scaffold subgraphs.
- Investigated use of counterfactuals and adverserial examples in tabular RNA sequence model robustness.
- Implemented and trained deep learning image models to predict dock scores of COVID-19 protein targets for virtual screening tasks.

Flatiron Institute Summer 2023
Center for Computational Biology *New York, NY*

Advisor: Olga Troyanskaya

- A case study on causal discovery with human tissue-specific gene expression data for inferring gene regulatory networks from functional networks (GitHub link).

Argonne National Laboratory Summer 2020, 2021
Advisors: Rick Stevens, Arvind Ramanathan *Chicago,IL*

- Developed optimal experimental design algorithms for selecting interventional experiments for recovering causal mechanisms in gene regulatory networks.
- Implemented DNA Assembly protocols on Opentrons OT-2 pipetting robots for Argonne's Rapid Prototyping Laboratory.

WORK EXPERIENCE

Lawrence Livermore National Laboratory June 2016 - Aug 2019
National Ignition Facility Computation Software Engineer *Livermore, CA*

Supervisor: Jarom Nelson

- Designed, developed and tested VBL (Virtual Beamline) laser propagation model of NIF laser system in C++ for use in high performance computing environments.

RELEVANT COURSEWORK

Probabilistic Graphical Models *Toyota Institute of Technology, Spring 2022*
Machine Learning *University of Chicago, Spring 2020*
Biophysics of Biomolecules *University of Chicago, Spring 2020*
Topics in Computer Architecture *University of Chicago, Winter 2020*
Machine Learning in Medicine, *University of Chicago, Fall 2019*
Argonne Training Program on Extreme-Scale Computing (ATPESC) *Argonne National Laboratory, Summer 2020*

TEACHING

CMSC 35440 - Machine Learning in Biology and Medicine *University of Chicago, Autumn 2023*
CMSC 14100 - Introduction to Data Science Guest Lecture *University of Chicago, Summer 2022*
CMSC 14100 - Introduction to Computer Science I *University of Chicago, Fall 2019*

PAPERS

Causal Discovery and Optimal Experimental Design for Genome-Scale Biological Network Recovery
PASC 2023 *June 2023*

Scaffold-Induced Molecular Subgraphs (SIMSG): Effective Graph Sampling Methods for High-Throughput Computational Drug Discovery
BMC Bioinformatics Supplement *April 2022*

Probing Decision Boundaries in Cancer Data Using Noise Injection and Counterfactual Analysis
Computational Approaches to Cancer Workshop at Supercomputing 2021 *Nov 2021*

IMPECCABLE: Integrated Modeling PipelinE for COVID Cure by Assessing Better LEads
ICPP '21: 50th International Conference on Parallel Processing, Lemont, IL *August 2021*

POSTERS

Hypothesis Ranking and Causal Discovery for Antimicrobial Resistance (AMR)
University of Chicago Data Science Institute AI + Science Summer School *August 2022*

Addressing Challenges in Developing Virtual Beamline (VBL): A Large-Scale, High-Energy Parallel Laser Simulation Code
Grace Hopper Celebration Poster Session *Sept 2018*

HONORS AND LEADERSHIP

Secretary of Energy Achievement Honor Award Feb, 2021 *National Virtual Biotech Lab Team*
Graduate Women in Computer Science Co-Chair 2020-2022 *University of Chicago*
Crerar Fellowship 2019 *University of Chicago*

VOLUNTEER WORK

South Side Science Festival *Summer 2022*
Editor at ACM's Student Magazine XRDS *2021-2022*
CS Education Week *Little Village High School, Fall 2020*
Girls Who Code *2018-2019*