Uthsav Chitra

35 Olden Street, Princeton, NJ 08540

Website: https://uthsavc.github.io

Education

Princeton University, Princeton, New Jersey — *Sept 2018 - Dec 2023 (expected)*
Advisor: Ben Raphael
Ph.D. Candidate in Computer Science
M. A. in Computer Science — *Received Sept 2020*

Brown University, Providence, Rhode Island — *Sept 2013 - May 2017*
Sc.B. Mathematics, A.B. Computer Science, A.B. Applied Math — GPA: 4.0/4.0

Publications

** denotes joint first authorship*

Mapping the topography of spatial gene expression with interpretable deep learning.
Uthsav Chitra, Brian J. Arnold, Hirak Sarkar, Cong Ma, Sereno Lopez-Darwin, Kohei Sanno, Benjamin J. Raphael.
In review at Nature Methods.

Slaying the chimera: a unified model of higher-order epistasis.
Uthsav Chitra*, Brian J. Arnold*, Benjamin J. Raphael.
In review at Nature Genetics.

Belayer: Modeling discrete and continuous spatial variation in gene expression from spatially resolved transcriptomics.
Cong Ma*, **Uthsav Chitra***, Shirley Zhang, Benjamin J. Raphael.
Cell Systems (2022). Previously appeared at *RECOMB 2022.*

NetMix2: Unifying network propagation and altered subnetworks.
Uthsav Chitra*, Tae Yoon Park*, Benjamin J. Raphael.
Journal of Computational Biology (2022). Previously appeared at *RECOMB 2022.*

Quantifying and Reducing Bias in Maximum Likelihood Estimation of Structured Anomalies.
Uthsav Chitra, Kimberly Ding, Jasper C. H. Lee, Benjamin J. Raphael.
International Conference on Machine Learning (ICML) 2021.

NetMix: A network-structured mixture model for reduced-bias estimation of altered subnetworks.
Matthew A Reyna*, **Uthsav Chitra***, Rebecca Elyanow, Benjamin J. Raphael.
Journal of Computational Biology (2021). Previously appeared at *RECOMB 2020.*

Analyzing the Impact of Filter Bubbles on Social Network Polarization.
Uthsav Chitra, Christopher Musco.
ACM International Web Search and Data Mining Conference (WSDM) 2020.

Random Walks on Hypergraphs with Edge-Dependent Vertex Weights.
Uthsav Chitra, Benjamin J. Raphael.
International Conference on Machine Learning (ICML) 2019.

Committee Selection is More Similar Than You Think: Evidence from Avalanche and Stellar.
Tarun Chitra, **Uthsav Chitra**.
Manuscript, 2019.

Honors and Awards

Siebel Scholar *2022*
- Award of $35,000 for "academic excellence and demonstrated leadership."

Best Reviewer Award, International Conference on Machine Learning (ICML) *2021, 2022*

NSF Graduate Research Fellowship *2020*

Jerome Stein Memorial Award, Brown University Applied Math Department *2017*
- Given to the top two students who "show outstanding potential in an interdisciplinary area that involves applied mathematics."

Phi Beta Kappa, Brown University *2016*
- Elected in my junior year (top 2% of class)

Top 200, William Lowell Putnam Math Competition *2015*

First Place, Brown University Hartshorn-Hypatia Math Examination *2013*

National semi-finalist, Siemens Competition (research project in number theory) *2012*

Teaching

Instructor/Curriculum Developer, Princeton Prison Teaching Initiative *2019-2023*
- Taught college-accredited math and computer science classes at NJ state prisons.
- Developed first-ever Java programming course for NJ state prisons.

Teaching Assistant/Grader, Brown University
- **MATH 1560:** Number Theory *Spring 2016, Spring 2017*
- **CSCI 1570:** Design and Analysis of Algorithms *Fall 2015, Fall 2016*
- **CSCI 1450:** Probability in Computing *Spring 2015*
- **CSCI 0530:** Linear Algebra for CS *Fall 2014*
- **MATH 1530:** Abstract Algebra *Spring 2014*

Counselor, Program in Mathematics for Young Scientists (PROMYS) *Summer 2014*
- Counselor for summer program that introduces high school students to higher math through elementary number theory.

Teaching Assistant, Art of Problem Solving *2012-2016*
- Assisted online, real-time math classes in algebra, number theory, combinatorics, and geometry.

Talks/Posters

Mapping the topography of spatial gene expression with interpretable deep learning.
Single Cell Analyses, Cold Spring Harbor Laboratory (poster) *November 2023*
Rutgers-Princeton Cancer Research Symposium (poster) *October 2023*
NCI Junior Investigator (JI) Annual Meeting *August 2023*

Belayer: Modeling discrete and continuous spatial variation in gene expression from spatially resolved transcriptomics
Rutgers-Princeton Cancer Research Symposium (poster) *October 2023*
NCI Junior Investigator (JI) Annual Meeting *August 2023*
Brigham Women's Hospital Advanced Biomedical Computation Series *March 2023*
NCI Spring School on Algorithmic Cancer Biology *March 2023*

NetMix2: Unifying network propagation and altered subnetworks
Conference on Research in Computational Molecular Biology (RECOMB) *May 2022*

NetMix: A network-structured mixture model for reduced-bias estimation of altered subnetworks

Conference on Research in Computational Molecular Biology (RECOMB) *June 2020*
Princeton University Generals Exam *May 2020*

Analyzing the Impact of Filter Bubbles on Social Network Polarization

ACM International Web Search and Data Mining Conference (WSDM) *February 2020*
KDD WISDOM Workshop *August 2019*

Random Walks on Hypergraphs with Edge-Dependent Vertex Weights

SIAM Conference on Discrete Mathematics *June 2022*
Princeton University Generals Exam *May 2020*
International Conference of Machine Learning (ICML) *June 2019*

Students Mentored

Clover Zheng, Princeton CS PhD student *2022-present*
Sunay Joshi, Princeton Math undergraduate *2022-present*
Madelyne Xiao, Princeton CS PhD student *2022*
Ahmed Shuaibi, Princeton QCB PhD student *2020-present*
Kimberly Ding, Princeton CS undergrad *2019-2021*

- Fall 2019: *Recommender Systems with Hypergraph Random Walks*
- Spring 2020: *Maximum Likelihood Estimation of Structured Anomalies*
- Senior Thesis 2020-2021: *Spatial-NetMix: Less Biased and More Flexible Anomaly Detection*
  - Received the "**Outstanding Computer Science Senior Thesis Prize**"

Shirley Zhang, Princeton CS undergrad/alumni *Summer 2020, 2021-2022*

- Received an **NSF Graduate Research Fellowship**

Service

Conference Reviewing

RECOMB 2020 poster session, ICML 2021 (**Top 10% Reviewer**), NeurIPS 2021, ICML 2022 (**Top 10% Reviewer**), RECOMB 2023 subreviewer, ISMB 2023 subreviewer, ICML 2023

Journal Reviewing

Bioinformatics, Frontiers in Big Data

Member, Princeton COS Graduate Student Committee *2022-2023*
Member, Princeton COS Ad Hoc Committee *2021*
Member, Princeton Graduate Engineering Council *2021-2023*
Officer, Brown Math Departmental Undergraduate Group *2015-2017*
Mentor, Brown Matched Advising Program for Sophomores *2016-2017*

Work Experience

Software Engineer, Facebook *2017-2018*

- Built infrastructure, machine learning models, and data pipelines for improving ad quality.

Software Engineering Intern, Facebook *Summer 2016*

- Worked on various video ads projects.

Hobbies/interests: Bouldering, puzzles, current events, making bad puns.