KABIR TRIPATHI

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EDUCATION

Tufts University Medford, MA

B.S. in Mathematics, B.S. Computer Science; **GPA: 3.82/4** September 2022 – May 2026

- **Relevant coursework:** Measure Theory (Graduate level), High-dimensional Probability (Graduate level), Parallel and High Performance Computing (Graduate level), Real Analysis II, Statistics, Advanced Optimization (Graduate level), Statistical Pattern Recognition, Algorithms, Real Analysis I, Mathematical Aspects of Data Science, Probability, Data Structures, Linear Algebra, Discrete Math, Multivariable Calculus, Game Theory
- **Teaching Assistant:** Mathematical Aspects of Data Science

PROFESSIONAL EXPERIENCE

Optimal Transport Group Medford, MA

Undergraduate Researcher *June 2024 –*

- Developing theory and applications for optimal transport based statistic that detects low dimensional signals
- Using subspace robust Wasserstein distances for numerous sparse data modeling problems, including simulating hadron collider data and change point detection
- Started and co-run Tufts' Diffusion Model Reading Group, hosting undergrad and grad students from Tufts and Boston University

High-dimensional Learning and Data Analytics (HILDA) Group Medford, MA

Undergraduate Researcher *Jan 2024 –*

- Research on Active Learning methods, specifically on learning representations to enhance efficiency of querying functions
- Presented research program and was awarded $5,000 grant from the Kokulis Family Endowed Fund
- Developed iterative algorithm that fine tunes diffusion maps via a graph-based density peak clustering procedure, improving upon hyperspectral image benchmarks by 14%
- First author on paper in submission at *IEEE Whispers*

Tufts University Mathematics REU Medford, MA

Undergraduate Researcher *June 2023 – August 2023*

- Proved spectral invariance in objective functions evaluating Lipschitz bounds of the phase retrieval problem that arises during X-ray crystallography
- Poster titled "Numerical Stability of Phase Retrieval for Frames" accepted in 2024 Joint Math Meetings

CemtrexLabs Brooklyn, NY

Software Engineer Intern *August 2021 – April 2022*

- Developed and pushed tools to track and manage ongoing projects into production
- Created Slack plug-ins to make daily status reports available instantaneously
- Automated end-to-end work flow from the Teamwork API to Slack using Python

SELECTED PROJECTS

Survey of Quantum State Tomography (Python) | *Low-rank matrix recovery*

- Implemented compressed sensing algorithm to recover quantum state given data measurements
- Implemented low-rank matrix recovery via Wasserstein barycenters (Rigollet, 2023) to compare with compressed sensing approach
- First known attempt at QST via Barycenters, exhibited advantage over CS approach and Restricted Boltzmann Machine

GREP - File Indexer (C++) | *Index/Search Directories*

- Created a command-line tool that performs efficient file search via a custom hash table implementation
- Ranked 2nd out of 150 for most efficient resource allocation (time and space complexity)

SKILLS

Languages: Python, C++

Skills: Numpy, Scipy, Scikit Learn, Numerical Analysis, Optimization, Algorithms