
CONTACT INFORMATION	435N 200W Utah Salt Lake City-84103	E-mail: u1471195@umail.utah.edu Mobile No: +1 8014207868 Github: DhruvMeduri
RESEARCH INTERESTS	My research interest is the design and analysis of algorithms in geometry and topology. Specifically, I am interested in pursuing areas such as Computational Topology, Topological Data Analysis(TDA) and Computational Geometry along with their applications in Machine Learning and Visualization.	
EDUCATION	University of Utah	2023–2028 (expected)
	<ul style="list-style-type: none"> PhD in Department of Computer Science 	
	Indian Institute of Science, Bangalore	2019–2023
	<ul style="list-style-type: none"> BS(Research) in Department of Mathematics, GPA: 8.6/10 – via 136 credits. 	
	National Public School, Koramangala.	2015–2019
	<ul style="list-style-type: none"> Grade-12 in Physics, Chemistry, Mathematics and Computer Science. Marks Obtained: 96.2/100 Grade-10. CGPA: 10/10 	
RESEARCH EXPERIENCE	Theory and Applications of the Mapper Graph	August 2023-to date
	Prof. Bei Wang, Scientific Computing and Imaging Institute	
	<p>The mapper graph is a topological structure which has the unique capability of clustering and visualizing point set data. However, there seems to be a lack of clarity in its theoretical properties and potential in application. I am currently attempting to contribute in this direction by trying to argue the explainability of the mapper as a clustering and visualization procedure. Further, I am also working on its potential applications for high dimensional visualization of representations of biomolecules.</p>	
	Simplification of Jacobi Sets for Time-Varying Data	May 2022-May 2023
	Prof. Vijay Natarajan, Computer Science and Automation Department IISc	
	<p>The Jacobi Set for time-varying scalar fields (path traced by the critical points) is often complicated and noisy. The problem is to simplify the Jacobi Set to obtain clear tracks of the critical points. The progress so far-</p> <ul style="list-style-type: none"> observed various flow data sets to design an effective algorithm. clustering critical points using the corresponding gradient magnitude fields. using these clusters to obtain a simplified Jacobi Set. 	
	Comparison Measures between Merge Trees	August 2021-December 2021
	Prof. Vijay Natarajan, Computer Science and Automation Department IISc	
	<p>Worked on the development of a software to compute comparison measures between merge trees for future projects in the lab. In particular-</p> <ul style="list-style-type: none"> efficiently implemented the Wasserstein distance between merge trees. enhanced the visualization of matchings obtained in computing the Wasserstein, Bottleneck and Tree Edit Distances. tested the implementations on various data sets and fixed existing bugs. <p>The link to the Github Repository.</p>	
	Automatic Seating Arrangement with Social Distancing	August 2020-August 2021
	Assistant Prof. Rahul Saladi, Computer Science and Automation Department IISc	
	<p>The problem is to fit the maximum number of rectilinear polygons such that the distance between any two polygons is greater than a discrete threshold (working towards a paper). The motivation for this comes from seating people in a stadium with a social distancing protocol. The contributions-</p> <ul style="list-style-type: none"> Developed a novel 5-approximation algorithm using a local incremental procedure. Proposed a simple constant factor approximation algorithm by fragmenting the domain. efficient implementations of the algorithms to reduce the complexity. 	

PUBLICATIONS

RELEVANT COURSE WORK	CS-6966: Local Explanation for Deep Learning models CS-6630: Visualization for Data Science, E0-234:Introduction to Randomized Algorithms, E0-208:Computational Geometry, MA-219: Linear Algebra, UM-201: Probability and Statistics, UM-204: Introduction to Basic Analysis, MA-231: Topology, MA-200: Multivariable Calculus, E9-253: Neural Networks and Learning Systems, Algebra-1, Algebra-2, Measure Theory, Complex Analysis, Ordinary Differential Equations, Graphics and Visualization-Currently.
COURSE PROJECTS	<ul style="list-style-type: none">• Implemented an entire website, resulting in expertise in HTML and JavaScript.• Built on the working of Concept Activation Vectors in CNN's and LLM's. This experience helped in better understanding of theoretical ideas in LLMs and explainability of complex neural networks.• Conducted a literature review of PCP Theorem along with Dinur's Proof. This provided a deeper understanding of complexity theory, expanders and random walks.• Conducted a literature review of geometric algorithms for optimized travelling of Unmanned Aerial Vehicles(UAV) and presented some possible future directions.• Implemented an email spam filter using neural networks and achieved 80% accuracy on a custom generated data set. This is the github link.• Currently working on t-distributed Stochastic Neighbour Embedding(t-SNE) based visualization techniques for visualizing the learning process in DeepQ Networks.
ACADEMIC ACHIEVEMENTS	<ul style="list-style-type: none">• Kishore Vaigyanik Protsahan Yojana (KVPY) - All India Rank: 158/~0.5M, provides scholarship for Undergraduate science education in India.• Indian Institute of Technology Joint Entrance Examination (IIT-JEE Main) - 98.6 percentile• National Standard Examination in Chemistry - 99 percentile• Awarded Certificate of Excellence from Prakash Javadekar, Minister Human Resource Development, Govt. of India for commendable performance in the Central Board of Secondary Education examination 12th standard (2019) in Chemistry and Computer Science.• Attended Vijyoshi Camp, 2018 - National Science Camp for KVPY scholars
TECHNICAL SKILLS	<ul style="list-style-type: none">• <i>Programming Languages:</i> C/C++, Python, JAVA, MATLAB• <i>Technical Softwares/API's:</i> SciPy, Pytorch, Paraview, OpenGL, VTK, TTK
EXTRA-CURRICULAR ACTIVITIES	<ul style="list-style-type: none">• IISc UG Sports Meet - Football Winning team• IISc UG Sports Meet - Tennis third Place• IISc UG Fest Pravega - Event Coordinator
REFERENCES	<ul style="list-style-type: none">• Prof. Bei Wang University of Utah E-mail: wang.bei@gmail.com• Prof. Vijay Natarajan Indian Institute of Science E-mail: vijay@iisc.ac.in