

DISHA SHUR

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Research interests: Interpretability of inferences on high-dimensional data such as language model activations.

Education

Purdue University - Ph.D., Computer Science

2022 -

Advisor: Prof. David F. Gleich

Purdue University - M.S., Electrical and Computer Engineering

2020 - 2022

Thesis: PageRank based representations, advised by Prof. David F. Gleich

IIST, Shibpur - B.Tech., Electronics and Telecommunication Engineering

2014-2018

Publications

* denotes equal contribution

1. **A flexible PageRank-based graph embedding framework closely related to spectral eigenvector embeddings**

TLDR YouTube Video [here](#)

*Disha Shur**, *Yufan Huang**, *David F. Gleich*

Accepted, available on [this link](#).

2. **Smoothed analysis of leader election in distributed networks**

*Anisur R. Molla**, *Disha Shur**

Accepted and presented at [The 22nd International Symposium on Stabilization, Safety, and Security of Distributed Systems \(SSS 2020\)](#).

3. **Two Dimensional Microwave Imaging Using a Divide and Unite Algorithm**

Disha Shur, *K. Yaswanth*, *Uday K. Khankhoje*

Presented at [2017 Progress in Electromagnetics Research Symposium - Fall \(PIERS - FALL\)](#), Nov,2017, published in *IEEE Xplore*.

Skills

Julia, Python, MATLAB, PyTorch, TensorFlow, LaTeX, C++

Relevant Projects and Research Experience

Research on randomized representation technique

May'24 -

Developing GTDA based interpretable representation technique with theoretical guarantees.

Research on Language model explainability

Jul'23 -

Experiments to understand in-context learning including topological representation of transformer weights for different class of prompts.

Julia package for GTDA

Jan'23 -

Wrote a preliminary Julia version of [Graph-based Topological Data Analysis algorithm](#) (GTDA)

Project on Graph Explainability, Purdue

Aug'22 - Nov'22

- Course project under [Prof. Pan Li](#)
- Proposed a framework that adapts [GSAT](#), originally meant for model interpretability on graph classification tasks, to node classification tasks.

Research on Personalized PageRank embedding, Purdue

Jan'21 - Apr'22

- Research Assistant with [Prof. David F. Gleich](#)
- Developed a node embedding algorithm for graphs and hypergraphs with localized runtime proportional to seedset volume based on personalized PageRank.

Project on Bidirectional Encoder Representations from Transformers (BERT), Purdue

Aug'20-Dec'20

- Course project under [Prof. David I. Inouye](#)
- Analyzed attention maps produced by the BERT model that verified and contrasted the attention mechanism with natural mechanism and semantic dependencies.

Research on Location-Based Social Networks (LBSNs), IIT Hyderabad

Aug'20 - Dec'20

- Interned with [Prof. Srijith P.K](#) at the [Brain group](#)
- Compared the results using random walk based procedure and neural network, for location prediction on LBSNs and attempted to eliminate the use of social network information by proposing the dataset as a k-uniform hypergraph.

Research on Smoothed Analysis of Distributed Algorithms, ISI Kolkata

Jan'20 - Aug'20

- Interned under [Prof. Anisur Molla](#)
- Developed an $O(\frac{\log n}{\sqrt{\epsilon}})$ round randomized and $O(\frac{\log^2 n}{\sqrt{\epsilon}})$ deterministic algorithm for smoothed analysis of distributed leader election problem.

Research on Reconstruction with sub-Nyquist Sampling, IISc

Feb'19-Sep'19

- A side project with [Prof. Chandra Murthy](#), while working for the 5G testbed
- Worked on reconstruction of field using few distribution-unaware samples using non-convex optimization techniques, majorization-minimization algorithm and finite rate of innovation.

Research on Image Reconstruction in the Microwave frequency, IIT Madras

May-Jul'17, Jul-Dec'18

- Intern, and later Project Assistant under [Prof. Uday K. Khankhoje](#)
- Developed an adaptive resolution based algorithm for reconstructing images developed via electromagnetic scattering in the microwave frequency range with application to tumor detection.

Teaching Experience

Graduate Teaching Assistant (TA), CS573: Data Mining, Purdue

Aug'22-Dec'22

TA with [Prof. Rajiv A. Khanna](#) for a class of 80 graduate students

Conducted doubt sessions, graded assignments and prepared theoretical and programming solutions on a broad range of topics and tools used for data mining.

Graduate Teaching Assistant (TA), ECE301: Signals and Systems, Purdue

Aug'21-Dec'21

TA with [Prof. Fengqing Zhu](#) for a class of 119 undergraduate students

Aided with hiring a grader, conducted review classes and doubt sessions, graded assignments and prepared solutions for a first class on concepts in signals and systems.

Other Research and Technical Projects

Algorithmic Economics under [Prof. Alex Psomas](#)

Jan'21 - May'21

Worked on application of machine learning methods in modelling non-truthful mechanisms.

Project Assistant, 5G Testbed, IISc

Jan'19-Nov'19

Worked on development of in-lab 5G testbed by implementing 3GPP Release 15 protocols using [Open Air Interface](#)(OAI).

Individually responsible for verifying and maintaining cross-platform adaptability of OAI codes with Keysight equipments and 5G signal studio

Elementary Teaching Kit, IEST, Shibpur

2015-2016

Developed a Python-based software for an inexpensive elementary teaching kit consisting of video lessons in the subjects of Mathematics, English, Hindi and Bengali. The hardware was taken care of by the rest of the group and the end product - an inexpensive learning kit was given away to NGOs.

Scholars For Change 2015, Indian Institute of Management(IIM-A)

Jun-Jul'15

Developed tutorial videos for select concepts in high school Science and Mathematics and contributed the huge pool created by IIM-A as a part of the program.

Volunteering Experience

Reviewer

4th workshop on Graphs and Complex structures for Learning and Reasoning

Dec'23

18th Women in Machine Learning (WiML) workshop, NeurIPS 2023

Nov'23

Supervolunteer, [WiML](#), NeurIPS 2021

Nov'21-Dec'21

Managed events at GatherTown for virtually hosting the workshop.

Managed 3 volunteers spread across 3 events - 2 talks and 1 social, along with other postings and announcements.

Volunteer, [WiML](#), NeurIPS 2020

Nov'20-Dec'20

Blogged on the conference activities, particularly on talks

Mentored a poster presentation

Co-curricular

Google Computer Science Research Mentorship Programme(CSRMP), 2021-B

Sep'21

Mentored by Google engineers and scientists on research pipelines and determining career pathway in Computer Science research.

Global Alumni Association of Bengal Engineering and Science University (GAABESU)

Sep'17

Travel grant to Nanyang Technological University (NTU), Singapore to present my work on Microwave Imaging, by [the alumni association](#) of IEST (Formerly BESU).

Summer Research Fellowship Programme (SRFP)

May'17

[Research fellowship](#) at IIT Madras for the summer of 2017.

Kshitij, IIT Kharagpur

Jan'15

1st in intra-college round, second runner up at the inter-college round at SoE, debate conducted at [Kshitij](#), the techno-management fest of IIT Kharagpur, jointly by Honeywell and Institute of Mechanical Engineers.

West Bengal Joint Entrance Examination(WBJEE)

June'14

Achieved a rank of 825 which stands at 99.5 percentile in [WBJEE](#), 2014.

Army Welfare Education Society (AWES)

Mar'13

Education Scholarship Scheme for Serving Army Personnel (ESSA) was conferred by [AWES](#) for academic records.

Other Interests

Watercolor Painting, Poetry, Exploring food from different cultures