

# DISHA SHUR

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**Research interests:** My research focuses on developing computing algorithms capable of efficiently analyzing data structured into large-scale graphs or higher-order structures, specifically hypergraphs. I am interested in applying the above frameworks to solve problems for better representation learning and developing explanations for neural network models.

## Education

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<b>Purdue University - Ph.D. in Computer Science</b>	<b>2022 -</b>
Advisor: <b>Prof. David F. Gleich</b>	
<b>Research focus:</b> Computation and learning on graphs and higher order structures	
<b>Purdue University - M.S., Electrical and Computer Engineering</b>	<b>2020 - 2022</b>
<b>Thesis:</b> PageRank Embedding, advised by <b>Prof. David F. Gleich</b>	
<b>IIST, Shibpur - B.Tech., Electronics and Telecommunication Engineering</b>	<b>2014-2018</b>

## Publications

\* denotes equal contribution

1. **A flexible PageRank-based graph embedding framework closely related to spectral eigenvector embeddings**  
*Disha Shur\**, *Yufan Huang\**, *David F. Gleich*  
Submitted, available on arXiv.
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*.

## Relevant Projects and Research Experience

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<b>Project on Graph Explainability, Purdue</b>	<b>Aug'22 - Nov'22</b>
<ul style="list-style-type: none"><li>• Course project under <b>Prof. Pan Li</b></li><li>• Proposed a framework that adapts <a href="#">GSAT</a>, originally meant for model interpretability on graph classification tasks, to node classification tasks.</li></ul>	
<b>Research on Personalized PageRank embedding, Purdue</b>	<b>Jan'21 - Apr'22</b>
<ul style="list-style-type: none"><li>• Research Assistant with <b>Prof. David F. Gleich</b></li><li>• Developed a node embedding algorithm for graphs and hypergraphs with localized runtime proportional to seedset volume based on personalized PageRank.</li></ul>	
<b>Project on Bidirectional Encoder Representations from Transformers (BERT), Purdue</b>	<b>Aug'20-Dec'20</b>
<ul style="list-style-type: none"><li>• Course project under <b>Prof. David I. Inouye</b></li><li>• Analyzed attention maps produced by the BERT model that verified and contrasted the attention mechanism with natural mechanism and semantic dependencies.</li></ul>	
<b>Research on Location-Based Social Networks (LBSNs), IIT Hyderabad</b>	<b>Aug'20 - Dec'20</b>
<ul style="list-style-type: none"><li>• Interned with <b>Prof. Srijith P.K</b> at the <a href="#">Brain group</a></li><li>• 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.</li></ul>	
<b>Research on Smoothed Analysis of Distributed Algorithms, ISI Kolkata</b>	<b>Jan'20 - Aug'20</b>
<ul style="list-style-type: none"><li>• Interned under <b>Prof. Anisur Molla</b></li><li>• Developed an <math>O(\frac{\log n}{\sqrt{\epsilon}})</math> round randomized and <math>O(\frac{\log^2 n}{\sqrt{\epsilon}})</math> deterministic algorithm for smoothed analysis of distributed leader election problem.</li></ul>	
<b>Research on Reconstruction with sub-Nyquist Sampling, IISc</b>	<b>Feb'19-Sep'19</b>
<ul style="list-style-type: none"><li>• A side project with <b>Prof. Chandra Murthy</b>, while working for the 5G testbed</li><li>• Worked on reconstruction of field using few distribution-unaware samples using non-convex optimization techniques, majorization-minimization algorithm and finite rate of innovation.</li></ul>	
<b>Research on Image Reconstruction in the Microwave frequency, IIT Madras</b>	<b>May-Jul'17, Jul-Dec'18</b>
<ul style="list-style-type: none"><li>• Intern, and later Project Assistant under <b>Prof. Uday K. Khankhoje</b></li><li>• Developed an adaptive resolution based algorithm for reconstructing images developed via electromagnetic scattering in the microwave frequency range with application to tumor detection.</li></ul>	

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## Teaching Experience

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### 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.

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## Other Research and Technical Projects

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### 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](#).
- Individually responsible for setting up, verifying and maintaining cross-platform adaptability of the code base across signal generating and detecting hardwares and softwares.
- Responsible for adapting the previous release code to 5G standards for uplink channel (PUSCH).
- Language used: C++, Python

### 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.

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## Skills

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

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## Volunteering Experience

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### 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

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## Co-curricular

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### 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.

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## Other Interests

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Watercolor Painting, Portrait Sketching, Writing poetry, Reading on human psychology and behavior, Exploring food from different cultures