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

Purdue University - Ph.D. in Computer Science **2022 –**

Researh focus: Computation and learning on higher order structures

Purdue University - M.S., Electrical and Computer Engineering **2020 – 2022**

Thesis: PageRank Embedding, advised by **Prof. David F. Gleich**

IIEST, 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**
   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

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.
- 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, IIEST, 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.

Skills

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

Volunteering Experience

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 **Sep'21**

Mentored by Google engineers and research scientists on current research methodologies 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 IIEST (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, Portrait Sketching, Writing poetry, Reading on human psychology and behavior, Exploring food from different cultures