

SHREYAS SAMAGA

ssamaga@purdue.edu | [Google Scholar](#) | [linkedin.com/in/shreyas-samaga](https://www.linkedin.com/in/shreyas-samaga) | samagashreyas.github.io

EDUCATION

Purdue University, USA

2021 – Present

PhD in Computer Science. GPA 3.67/4.00 | Advisor [Prof. Tamal Dey](#)

Projects:

- Contributed to a foundational paper on [Topological Deep Learning](#) and its published library [TopoModelX](#)
- Proposed [GRIL](#) (Generalized Rank Invariant Landscape), a 2-parameter persistence-based vectorization which got accepted as a spotlight work at the TAG-ML Workshop at ICML 2023
- Proved GRIL is differentiable to build one of the first bifiltration learning pipelines resulting in [D-GRIL](#), and showed that it can be applied to graph learning in various domains, including drug discovery
- Devised and implemented algorithms for complexes of persistence modules which can be used to compute persistent sheaf cohomology among other things ([Paper](#))
- Extracted topological information from spatio-temporal data using multiparameter zigzag persistence

Indian Institute of Science Education and Research Bhopal, India

2015 – 2020

BS-MS Dual Degree Program majoring in Mathematics. GPA 9.33/10 | Department Gold Medalist

EXPERIENCE

Lawrence Berkeley National Laboratory, USA

Jun 2023 – Aug 2023

- Worked on topological analysis of Zeolites (microporous crystals) using multiparameter persistent homology to capture their structure
- Used gradient based tree learning for dimensionality reduction of the Persistence Images of Zeolites to reduce the redundancy in the captured topological information

INRIA Saclay, France

May 2023 – Jun 2023

- Proved that GRIL (Generalised Rank Invariant Landscape) is stratifiably smooth and computed the gradient

Adobe Inc., India

May 2022 – Aug 2022

- Used the topological information present in the self-attention maps of language models like BERT, when modelled as weighted graphs, to improve the performance on GLUE Benchmark tasks by about 3%
- Explored the idea of topological distillation for self-attention maps in a teacher-student learning framework

Ethereum Foundation, Remote Work

May 2021 – Aug 2021

- Identified critical network links that an adversarial attack could exploit to disrupt the network's functionality
- Applied TDA techniques to Eth 2.0 network to strengthen the structural and health analysis of the network

IIT Delhi, India

May 2020 – Oct 2020

- [Evaluated](#) the effect of hypertension and diabetes on COVID-19 mortality in India using machine learning models. People with diabetes are 2.11 times more likely to have a fatal outcome
- Predicted the mortality of COVID-19 using machine learning models with an AUC-ROC of 0.92 based on non-invasive blood parameter data and [published](#) the results

AWARDS AND SCHOLARSHIPS

- NSF Travel Grant to present our work at Symposium on Computational Geometry 2023 in Dallas 2023
- Director's Gold Medal (Awarded to the student with best all-round performance through undergrad) 2020
- CNR Rao Education Foundation Prize (Awarded to the student with the highest GPA in freshman year) 2016
- INSPIRE (Awarded by Govt. Of India to students in the top one percentile in Grade XII) 2015

TECHINICAL SKILLS

Python, C++, C, R

NumPy, Pandas, Scikit-learn, PyTorch, PyTorch Geometric, Slurm, Linux, Git