Soham Mukherjee

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EDUCATION

Purdue University   West Lafayette, IN, USA
PhD. Student, Advisor: Tamal K .Dey   Aug 2020 –Aug 2022(Expected)

The Ohio State University   Columbus, OH, USA
PhD Student, GPA: 3.94/4.00   Aug 2017 –Jul 2020
  – Transferred to Purdue with Prof. Tamal K Dey

Jadavpur University   Kolkata, India
B.E. in ECE, GPA: 9.51/10.00   Aug 2013 –Jul 2017
  – Thesis: "FPGA Implementation of Stochastic Circuit"

EXPERIENCE

Purdue University   West Lafayette, USA
Graduate Research Assistant   Aug 2020 - Aug 2022 (Expected)
  – Finding Clinically Relevant Proteins from Covid-19 Flow-cytometry Data via Persistent Homology

The Ohio State University   Columbus, USA
Graduate Research Assistant   Aug 2017 - Jul 2020
  – Gene-expression classification using persistent cycles
  – Denoising with Discrete Morse Theory

Georg-August Universität Göttingen   Göttingen, Germany
Summer Intern   May 2016 - Jul 2016
  – Evaluation of Waspmote Cryptography

Jadavpur University   Kolkata, India
Undergraduate Researcher   Aug 2013 - Jul 2017
  – FPGA Implementation of Stochastic Circuits

PUBLICATIONS

[1] T. Dey, S.Mandal, and S.Mukherjee, "Gene expression classification using topology and machine learning", Accepted in APBC 2021.

[2] S.Mukherjee and R. Slechta, "Denoising with discrete morse theory", Submitted to CGI 2021.

Teaching

- **Teaching Assistant** at The Ohio State University   Fall 2018
  Java Basics (CSE 1223)
- **Teaching Assistant** at The Ohio State University   Spring 2019
  Java Basics (CSE 1223)
- **Teaching Assistant** at The Ohio State University   Fall 2019
  Computer Architecture (CSE 3421)
- **Teaching Assistant** at The Ohio State University   Spring 2020
  Java Basics (CSE 1223)

Skills

- **Machine Learning:** Machine Learning on Graphs, Neural Networks
- **Data Analysis:** Topological Data Analysis, Morse Theory
- **Code:** C++, Python, Matlab
- **Skill Group:** PyTorch, PyTorch-Geometric, Tensorflow, Keras

Projects

- Denoising with Discrete Morse Theory (Surface Reconstruction ,Persistence Homology, 2020)

  Denoising a noisy data is a fundamental task in this data-driven world. In this paper we provide a persistence-guided discrete Morse theoretic denoising framework. We then discuss the results applying our framework in the field of surface reconstruction from noisy point samples and also extracting surfaces from noisy 3D grayscale images. Our paper is a synergy between classical surface reconstruction and recent findings of Topological Data Analysis.

- Gene-Expression Data Classification (ML,Persistence Homology, 2020)

  Interpretation of high-throughput gene expression data continues to require mathematical tools in data analysis that recognizes the shape of the data in high dimensions. The topology relevant curated data that we obtain provides an improvement in deep learning based supervised classifications. We further show that the representative cycles we compute have an unsupervised inclination towards phenotype labels.

Scholarships and Awards

- OSU CSE Departmental Fellowship   2017–2018
- University Bronze Medal   2017
- DAAD Scholarship   2016

Extracurricular Activities

- Joint President of Buckeye Bengalis   2019–2020
  Enhancing cultural diversity at OSU by introducing a glimpse of Bengali culture.
- Member at Kaleidoscope   2017–Present
  Voice actor in this performing arts group
- Member of Science Club at Jadavpur University   2014–2017
  Participated and mentored teams in annual robotics competition Jontro-Tontro