ANIRUDDHA GANGULY

aniganguly@cs.stonybrook.edu ◇ 631-495-4875 ◇ LinkedIn ◇ GitHub ◇ Scholar
Stony Brook, New York, USA

EDUCATION

Stony Brook University, NY, USA Jan, 2023 - Jan, 2028 (Expected)
Ph.D. in Computer Science, Advised by **Dr. Chao Chen**
Research Area: Spatial Transcriptomics, Graph Neural Networks, Medical Image Analysis CGPA: 3.87/4.00

Bangladesh University of Engineering & Technology, Dhaka, Bangladesh Feb, 2017 - Feb, 2021
B.Sc. in Computer Science & Engineering CGPA: 3.73/4.00

WORK EXPERIENCE

Stony Brook University (Research Assistant) Jan, 2024 - Present

Graph Neural Networks and efficient graph construction for gene expression prediction from histopathology images in Spatial Transcriptomics (ST). Uncertainty guided gene expression smoothing.

Intelligent Machines (AI Engineer) Jul, 2021 - Nov, 2022

Built, scaled, and maintained multi-class real-time object detectors achieving 95%+ detection accuracy and reducing client costs by over 350%.

Technohaven Company Ltd. (Blockchain Engineer) Nov, 2020 - Jan, 2022

Built enterprise-scale private blockchain solutions for clients using Hyperledger Fabric and R3 Corda.

PUBLICATIONS

1. **MERGE: Multi-faceted Hierarchical Graph-based GNN for Gene Expression Prediction from Whole Slide Histopathology Images**
   First author at **CVPR 2025** [Paper] [GitHub]
   - We use a Graph Attention network to predict spatially resolved gene expressions in ST data.
   - We propose a multi-faceted graph construction strategy to identify and utilize dependencies among morphologically identical tissue groups, regardless of spatial proximity.
   - We outperform baselines and SOTA methods on three datasets using three metrics - MSE, MAE, PCC.
2. **3D-FFS: Faster 3D object detection with Focused Frustum Search in sensor fusion based networks**
   First author at **IROS 2021** [Paper]
   - We aggregate intrinsic properties of 3D point clouds to constrain search space for 3D object detectors.
   - We propose a lightweight, modular heuristic for search space reduction in sensor fusion based detectors.
   - We reduce inference and training times of 3D object detectors by up to 58.96% and 62.80% respectively, while reducing memory usage by up to 58.53%.
3. **Online Detection of Attentiveness of Students with Special Needs**
   Co-author at **ACII 2022** [Paper]
   - We curate a dataset of 48 activity sessions of 9 students, spanning 11 activity types across 3 activity groups, extending 1:13:08 hours at 30 FPS. Annotations (low, mid, high) are done manually by the instructors.
   - We design an ensemble of five feature extractors by ablating over various architectures for each feature:
     - Atypical movement recognizer (Temporal Segment Network)
     - Working status detector (2D CNN with Temporal Shift Module)
     - Gaze detector (Temporal Segment Network)
     - Activity recognizer (Two-stream Inflated 3D ConvNet)
     - Base attentiveness feature extractor (SlowFast module)
   - We outperform all baselines significantly in real world settings to classify attentiveness as low, mid, and high.

ONGOING PROJECTS

1. **RankByGene: Gene-Guided Histopathology Representation Learning Through Cross-Modal Ranking Consistency (Submitted, under review)** [Pre-print]
   - We propose a novel cross-modal ranking consistency mechanism to enhance image-gene alignment.
   - We introduce knowledge distillation to improve robustness against sparsity and noise in ST data.
   - We set up downstream experiments on gene expression prediction, slide classification, and survival analysis to demonstrate the improvements through our approach
2. **Uncertainty Guided Smoothing of Gene Expressions in Spatial Transcriptomics Data**
   - We propose a new metric to compute surrogate uncertainty for gene expression prediction from images.
   - We calibrate an image-to-uncertainty model to this surrogate uncertainty, enabling uncertainty estimation at inference time.
   - We aggregate predicted gene expressions and SPCS-smoothed gene expressions using the predicted uncertainty, to enable morphology-aware gene expression smoothing.
3. **TopoScope: A Visual Analysis Platform for Exploring Topological and Spatial Interactions**
   - TopoScope is the first comprehensive visual tool that integrates topological methods for spatial omics data, capturing higher-order cell-cell interactions.
   - We design a fully integrated, end-to-end pipeline for survival and population-level analysis.
   - Besides identifying statistically significant spatial patterns, TopoScope localizes and visualizes differentiable phenotypic patterns derived from topological and spatial analysis.

SKILLS

Programming	Python, R, Java, C++, JavaScript
Libraries and Frameworks	PyTorch, TensorFlow, PyTorch Geometric, Torchvision, Node.js, Vue.js
Tools	Git, Docker, Databricks, GCP, QPath

ORGANIZATIONS AND LEADERSHIP ROLES

- **Vice President, Bangladeshi Graduate Students' Association** Aug, 2024 - Present
- **Vice Chairperson, IEEE Computer Society BUET Student Branch Chapter** Feb, 2020 - Feb, 2022
- **President, Murchhona:BUET (Central Cultural Organization at BUET)** Feb, 2020 - Feb, 2022

ACHIEVEMENTS & AWARDS

- **IEEE CS Lance Stafford Larson Outstanding Student Paper Award - Second Place** **2021**
- **International Blockchain Olympiad - Silver Medal** **2021**
- Bangladesh Blockchain Olympiad - Category Champion (FinTech) 2021
- International Blockchain Olympiad - Award of Merit 2020
- Bangladesh Blockchain Olympiad - National Champion 2020

REFERENCES

- Dr. Chao Chen
  Associate Professor, Department of Biomedical Informatics
  Stony Brook University, NY, USA
  Email: chao.chen.1@stonybrook.edu
  Website: https://chaochen.github.io