

Sayan Ghosal

CONTACT INFORMATION

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Linkedin | Website

PROFESSIONAL SUMMARY

- Data science researcher with 5+ years of experience in high dimensional data analysis which involves building data modality agnostic robust and interpretable models for medical image analysis.
- Developed and built a collaborative network with scientists across the globe, and engaged in multiple collaborative projects which led to 5 publications in peer reviewed conferences and journals.
- Passionate about finding and decoding the risk propagation mechanism for different neuropsychiatric diseases through data-driven learning and inference on biomedical datasets.

EDUCATION

**Department of Electrical And Computer Engineering,
Johns Hopkins University, Ph.D., 2022 (expected)**

- Advisor: Prof. Archana Venkataraman

**Department of Applied Mathematics And Statistics,
Johns Hopkins University, M.S.E., Spring 2021 (expected)**

- GPA: 4.0/4.0 (ongoing)

**Department of Electronics and Telecommunication Engineering,
Jadavpur University, B.E., 2017**

- Honors Thesis: A novel non-rigid registration method for zebrafish larval images
- Advisor: Prof. Ananda Shankar Chowdhury
- CGPA: 9.3/10.0

RESEARCH INTERESTS

Diagnostic Modeling, Multiview Learning, Machine Learning, Deep Learning

RESEARCH SKILLS

- Predictive Modeling.
- Designing robust optimization algorithms.
- Building data modality agnostic transferable and generalizable models.
- Handling large p , small n problems
- Generative-discriminative modelling.
- Handling missing data.
- Incorporating hierarchical structures in deep learning models.
- Developing interpretable feature detection techniques.

RESEARCH EXPERIENCE

Johns Hopkins University

Graduate Research Assistant

2017 -

Advisor: Prof. Archana Venkataraman, Department of Electrical and Computer Engineering

- G-MIND: An End-to-End Multimodal Imaging-Genetics Framework for Biomarker Identification and Disease Classification
 - Developed a novel deep neural network to integrate high dimensional multi-modal data like brain imaging and genetics data.
 - Performed a classification task, while handling missing data.

- Identified and ranked features using an interpretable network.
- Bridging Imaging, Genetics, and Diagnosis in a Coupled Low-Dimensional Framework
 - Designed a novel generative-discriminative model for disease classification and feature selection.
 - Developed an ADMM based robust optimization strategy that enhances the reproducibility of the model.
 - Incorporated biological structures by using the interconnectedness information of different features.
- A Generative-Predictive Framework to Capture Altered Brain Activity in fMRI and its Association with Genetic Risk: Application to Schizophrenia
 - Implemented a generative-predictive framework that captures the differences in regional brain activity between a neurotypical cohort and a clinical population.
 - Incorporated polygenic risk scores to identify neuroimaging endophenotypes.

University of Alberta, Canada

Research Assistant

2016

Advisor: Prof. Nilanjan Ray, Department of Computing Science Science.

- Deep Deformable Image Registration
 - Implemented a deep deformable registration algorithm for MRI images.
 - Improved the non-convex optimization of diffeomorphic demons by introducing Fully Convolutional Neural Networks (FCNN).

Jadavpur University, India & University of Padova, Italy

Undergraduate Researcher

2015-2017

Advisor: Prof. Ananda Shankar Chowdhury, Department of Electronics and Telecommunication Engineering.

- A novel non-rigid registration method for zebrafish larval images
 - Proposed an unique patch based coarse-to-fine algorithm for non-rigid registration of volumetric zebrafish larval image datasets.
 - An overlapping patch based approach was taken to find accurate correspondence using minimum weight bipartite graphs.

PUBLICATIONS

S. Ghosal, *et al.*, "A Generative-Discriminative Framework that Integrates Imaging, Genetic, and Diagnosis into Coupled Low Dimensional Space", NeuroImage 2021. (In submission)

S. Ghosal, *et al.*, "G-MIND: An End-to-End Multimodal Imaging-Genetics Framework for Biomarker Identification and Disease Classification", Proc. SPIE, Medical Imaging 2021: Image Processing. arXiv:2101.11656

Selected for Special Oral Presentation ("Deep Dive"), and received best student paper award

S. Ghosal, *et al.*, "Bridging Imaging, Genetics, and Diagnosis in a Coupled Low-dimensional Framework", in MICCAI: Medical Image Computing and Computer Assisted Intervention, 2019. Selected for Early Acceptance

S. Ghosal, *et al.*, "A generative-predictive framework to capture altered brain activity in fMRI and its association with genetic risk: application to Schizophrenia", Proc. SPIE 10949, Medical Imaging 2019: Image Processing.

Sayan Ghosal, Nilanjan Ray, Deep deformable registration: Enhancing accuracy by fully convolutional neural net, Pattern Recognition Letters.

S. Ghosal, *et al.*, "A novel non-rigid registration algorithm for zebrafish larval images," 2017 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC).

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| REVIEWER ACTIVITY | <ul style="list-style-type: none"> • NeuroImage • MICCAI: Intl Conference on Medical Image Computing and Computer Assisted Intervention | |
| TUTORING AND MENTORSHIP | <ul style="list-style-type: none"> • HopHacks2020 (Mentor) • Signals, Systems and Learning (TA) | |
| HONORS AND AWARDS | <ul style="list-style-type: none"> • MICCAI Student Participation Award • Mitacs Globalink Research Fellowship Award | 2020 2016 |
| RELEVANT SKILLS | Programming Languages: MATLAB, Python, \LaTeX Libraries: PyTorch | |