AGNISH BHATTACHARYA

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LinkedIn ◇ GitHub ◇ Google Scholar

EDUCATION

BE in Electrical Engineering, Jadavpur University *July 2020 - July 2024*
CGPA: 9.22/10

ICSE and ISC, Science, St. Xavier's Institution *March 2013 - March 2020*
Score - 98.2% (ICSE Aggregate) and 98.25% (ISC Aggregate)

INDUSTRIAL EXPERIENCE

Sumitomo Mitsui Financial Group India Credit, Mumbai, India *June 2024 - Present*
Management Trainee, Corporate Strategy & Planning

- Involved in strategic projects as a part of the company's analytical team.
- Working mostly on SAS & Excel frameworks.

RESEARCH EXPERIENCE

Indian Statistical Institute, Kolkata, India *August 2022 - Present*
Research Intern, ECS Unit — Advisor: Dr. Swagatam Das

- Learned about advanced **Data Augmentation** & **Imbalance-handling** methodologies.
- Worked on the development of **MixUp** methods & **Bias-Mitigation** techniques for improved classification of minority classes in imbalanced datasets.

Indian Institute of Technology, Kanpur, India *May 2023 - July 2023*
Research Intern, Comp-Bio Research Group — Advisor: Dr. Hamim Zafar

- Developed an architecture for **graph representation learning** on multi-omics data.
- Analyzed complex biological data for tissue-wise cell clustering.

Leiden Medical University, Netherlands *August 2022 - June 2023*
Research Intern, Division of Image Processing — Advisor: Dr. Marius Staring

- Worked on tumour growth modelling from Brain MRI scans using Neural Implicit Functions.
- Learned about 3D-image reconstruction and **Generative Adversarial Networks**.

Jadavpur University, India *February 2022 - September 2022*
Research Assistant, CMATER Lab — Advisor: Dr. Ram Sarkar

- Developed meta-heuristic hybrid **feature-selection algorithms** for computationally effective classifications.
- Composed **semantic segmentation architectures** and performed **loss function engineering**.

RESEARCH PUBLICATIONS

- **Agnish Bhattacharya**, Biswajit Saha, Soham Chattopadhyay, Ram Sarkar, "Deep Feature Selection using Adaptive β-Hill Climbing aided Whale Optimization Algorithm for Lung and Colon Cancer Detection," (*Published in* ***Biomedical Signal Processing and Control, ELSEVIER***).
  - Proposed a meta-heuristic hybrid optimization algorithm, AdBet-WOA, to classify the lung and colon cancer histopathological images (LC25000 dataset) into 2, 3 and 5 classes with benchmarking accuracies of 99.99%, 99.97%, and 99.96% respectively.

- Faizanuddin Ansari, **Agnish Bhattacharya**, Biswajit Saha, Swagatam Das, "**Mo2E: Mixture of Two Experts for Class-Imbalanced Learning from Medical Images**," (*Presented in* ***IEEE ISBI, 2024***).
  - Devised a method using two different CNN-based experts & MixUp regularization to effectively learn the boundaries within the head classes, between the head and tail classes, and within the tail classes, tackling the problem of imbalance in medical image datasets.

ONGOING PROJECTS

- **Spatial Multi-omics integration using Graph Variational Auto-Encoders** (Project Link)
  - Working on the development of a novel framework that leverages a 'Graph Attention Variational Auto-Encoder' and an 'Adaptive Spatial Attention' mechanism to seamlessly reduce the high-dimensional multi-omics data to a common low-dimensional latent space embedding.
  - The framework also incorporates an OpenAI's 'CLIP' inspired loss function to precisely represent the similarity between the data points in the embedding, for accurate final clustering of the cells in a tissue sample.
- **Leveraging Contextual Bias Information for Fair and Robust Classification**
  - Developed a novel augmentation technique to overcome spurious correlations in datasets, enhancing the robustness & fairness of classification models.
  - The proposed method synthesizes new training examples by combining the background of majority class bias label images with the foreground of minority class bias label images within the same class.
- **PITSNet: A Poly-Attention Intel Transfer Segmentation Network for Skin Lesion Segmentation** (Project Link)
  - Developed a state-of-the-art segmentation architecture incorporating ConvNeXT layers as the encoder with a bottleneck decoder having a compression ratio of 0.25, followed by the addition of attention-based squeeze excitation modules for intelli transfer from the initial to the latter layers.
  - The architecture achieved benchmarking IoU and Dice scores of 0.948 and 0.974 respectively on the ISBI-2016 dataset.

OPEN-SOURCE PROJECTS

- **Melanoma detection through Semantic Segmentation using U-Net** (Project Link)
  - Illustrated a pipeline to generate near to accurate masks by performing Semantic Segmentation on the PH2 dataset using U-Net, followed by feature extraction and classification using EfficientNet-b4-widese.
- **Deep feature extraction from CNNs followed by optimization with GA**(Project Link)
  - Developed a project based on the deep analysis and optimization of histopathological image samples of the BreakHis dataset to classify the breast tumor tissue into benign or malignant, with the feature space further optimized using Genetic Algorithm to reduce the computational burden.
- **Classification of the digits of the MNIST dataset with a novel CNN model** (Project Link)
  - Created a light-weight Convolution Neural Network architecture from scratch to classify the digits of the MNIST dataset, with an near-to-benchmark accuracy of around 98%.
- **SARS-CoV-2 detection using SVM, MLP and KNN models** (Project Link)
  - Developed a project classifying the covid lung CT-Scan images by extracting the Gabor, GLCM, and Haralick features from the SARS-COV-2 CT-Scan dataset and applying different classification models on them.

RESEARCH INTERESTS

Broad Interests	Computer Vision, Deep Learning, Medical Image Analysis
Specific Interests	Architecture Development, Generative Networks, Image Segmentation, Imbalance Handling

TECHNICAL SKILLS

Languages	Python, C/C++, R, MATLAB, SQL, HTML/CSS
Tools/Frameworks	PyTorch, TensorFlow, OpenCV, Pandas, NumPy, Matplotlib, Linux, SAS, Excel

ACHIEVEMENTS/AWARDS

- **All India Rank 7** at the ICSE Examinations (Class X) and **All India Rank 8** at the ISC Examinations (Class XII)
- WBJEE (2020) Rank: **701/1L (99.3 %ile)**
- **SURGE-2023 Research Fellowship** by Indian Institute of Technology, Kanpur (Certificate)